Surftest

Formtracer

Contracer

Roundtest
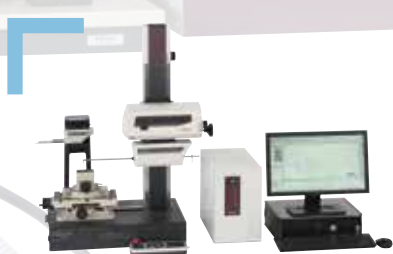
INDEX

SV-C3200 / SV-C4500

CV-2100

SJ-410

SV-C4500 CNC

RA-1600M

Mitutoyo

Surftest SJ-210

SERIES 178 — Portable Surface Roughness Tester
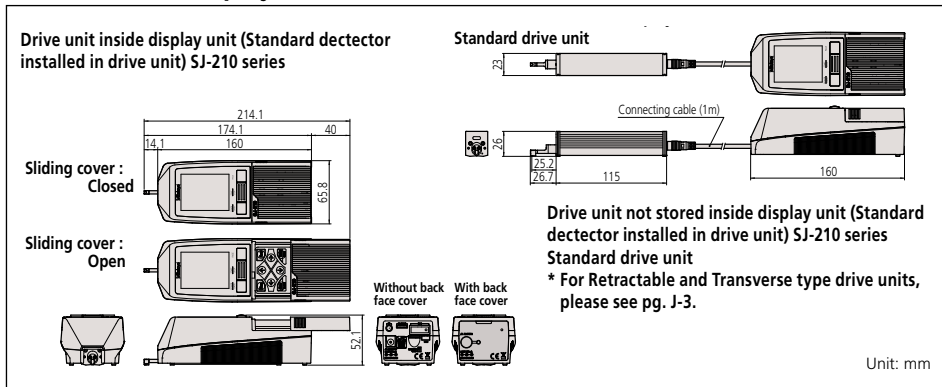
Surftest SJ-210

FEATURES

- The 2.4-inch color graphic LCD provides excellent readability and an intuitive display that is easy to negotiate. The LCD also includes a backlight for improved visibility in dark environments.
- The Surftest SJ-210 can be operated easily using the buttons on the front of the unit and under the sliding cover.
- Up to 10 measurement conditions and one measured profile can be stored in the internal memory.
- An optional memory card can be used as an extended memory to store large quantities of measured profiles and conditions.

- Access to each feature can be password-protected, which prevents unintended operations and allows you to protect your settings.
- The display interface supports 16 languages, which can be freely switched.
- An alarm warns you when the cumulative measurement distance exceeds a preset limit.
- The Surftest SJ-210 complies with the following standards: JIS (JIS-B0601-2001, JIS-B0601-1994, JIS B0601-1982), VDA, ISO-1997, and ANSI.
- In addition to calculation results, the Surftest SJ-210 can display sectional calculation results and assessed profiles, load curves, and amplitude distribution curves.

SPECIFICATIONS/CONFIGURATION

Model No.	SJ-210					
Order No. (inch/mm)	**178-561-01A**	**178-561-02A**	**178-563-01A**	**178-563-02A**	**178-565-01A**	**178-565-02A**
Drive unit	Standard type (**178-230-2**)		Retractable type (**178-235**)		Transverse tracing type (**178-233-2**)	
Detector	0.75mN type (**178-296**)	4mN type (**178-390**)	0.75mN type (**178-296**)	4mN type (**178-390**)	0.75mN type (**178-387**)	4mN type (**178-386**)
Display unit	Compact type (178-253A)					
Detector: Tip angle	60°	90°	60°	90°	60°	90°
Stylus tip radius	2µm	5µm	2µm	5µm	2µm	5µm
Detector measuring force	0.75mN	4mN	0.75mN	4mN	0.75mN	4mN
Standard accessories	**12BAA303** Connecting cable **178-602** Roughness specimen (Ra 3.00µm) **12BAK699** Carrying case **12BAK700** Calibration stage **12BAK820** Protective sheets for display AC Adapter Operation manual Quick reference manual Warranty				**12BAA303** Connecting cable **178-606** Roughness specimen (Ra 1.00µm) **12AAE643** Point-contact adapter **12AAE644** V-type adapter **12BAK699** Carrying case **12BAK700** Calibration stage **12BAK820** Protective sheets for display AC Adapter, Operation manual Quick reference manual, Warranty	

DIMENSIONS   Display unit, Drive unit

Drive unit inside display unit (Standard dectector installed in drive unit) SJ-210 series

Sliding cover : Closed

Sliding cover : Open

214.1
174.1
14.1   160   40
65.8

Without back face cover   With back face cover

52.1

Standard drive unit

23

Connecting cable (1m)

26

25.2
26.7   115   160

Drive unit not stored inside display unit (Standard dectector installed in drive unit) SJ-210 series
Standard drive unit
* For Retractable and Transverse type drive units, please see pg. J-3.

Unit: mm

Technical Data: SJ-210

X axis (drive unit)
 Measuring range: .70",17.5mm(.22",5.6mm (Transverse tracing drive unit type))
 Measuring speed: .01, .02", .03"/s(0.25, 0.5, 0.75mm/s .039"/s (1mm/s) (Returning))
Detector
 Range: 360µm (-200µm to +160µm)
 Measuring method: skidded
 Measuring force: 0.75mN or 4mN
 Stylus tip: Diamond, 90° / 5µmR (60° / 2µmR)
 Skid radius of curvature: 40mm
 Skid force: less than 400mN
 Type: Differential inductance
Power supply: Two-way power supply: battery (rechargeable Ni-MH battery) and AC adapter
 Charging time: about 4hours (may vary due to ambient temperature)
 Endurance: about 1000 measurements (differs slightly due to use conditions/ environment)
External I/O: USB I/F, Digimatic Output, Printer Output, RS-232C I/F, Foot SW I/F
Data storage: Memory card (option **12AAL069**)
Dimensions (W x D x H)
 Display unit: 2.05x2.59x6.3"(52.1 x 65.8 x 160mm)
 Drive unit: 6.85x2.59x2"(115 x 23 x 26mm)
Mass: About 1.1lb (0.5kg) (Display unit + Drive unit + Standard detector)

Evaluation Capability: SJ-210

Applicable standards:
 JIS'82, JIS'94, JIS'01, ISO'97, ANSI, VDA
Assessed profiles:
 Primary profile, Roughness profile, DF profile, Roughness profile-Motif
Evaluation parameters:
 Ra, Rc, Ry, Rz, Rq, Rt, Rmax, Rp, Rv, R3z, Rsk, Rku, Rc, RPc, Rsm, Rz1max, S, HSC, RzJIS, Rppi, RΔa, RΔq, Rlr, Rmr, Rmr(c), Rδc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, Rpm, tp, Htp, R, Rx, AR, Possible Customize
Analysis graphs: Bearning area curve / Amplitude distribution curve
Digital filters: Gaussian , 2CR75 , PC75
Cut off length: λc: .003, .01, .03, .1" (0.08, 0.25, 0.8, 2.5mm) λs: .1", .3"(2.5, 8µm)
Sampling length: .003", .01", .03", .1" (0.08, 0.25, 0.8, 2.5mm)
Number of sampling lengths (x n):
 x1, x2, x3, x4, x5, x6, x7, x8, x9, x10 arbitrary length (0.3 to16.0mm: 0.01mm interval)
 x1, x2, x3, x4, x5, x6, x7, x8, x9, x10 arbitrary length (0.3 to 5.6mm: 0.01mm interval)*
 * Only for Transverse tracing drive unit type

Function: SJ-210

Customization: Desired parameters can be selected for calculation and display.
GO/NG judgment: By max value / 16% / Standard deviation
Storage of measurement condition: Save the conditions at power OFF
Storage: Internal memory: Measurement condition (10 sets), Measured profile (1set)
 Memory card (Option): 500 measurement conditions, 10000 measured profiles, 500 display images
 Text file (Measurement conditions / Measured profile / Assessed profile / Bearing area curve / Amplitude distribution curve)
Calibration: Auto-calibration with the entry of numerical value / Average calibration with multiple measurement (Max.5 times) is available

Technical Data: SJ-310

X axis (drive unit)
Measuring range: .70", 17.5mm(.22",5.6mm (Transverse tracing drive unit type))
Measuring speed: .01", .02", .03"/s (0.25, 0.5, 0.75mm/s .039"/s(1mm/s) (Returning))

Detector
Range: 360µm (-200µm to +160µm)
Measuring method: skidded
Measuring force: 0.75mN or 4mN
Stylus tip: Diamond, 90° / 5µmR (60° / 2µmR)
Skid radius of curvature: 40mm
Skid force: less than 400mN
Type: Differential inductance
Power supply: Two-way power supply: battery (rechargeable Ni-MH battery) and AC adapter

Battery
Charging time: 4 hours maximum
Recharge cycles: Approximately 1500 times (slightly varies with the usage and environmental conditions)
External I/O: USB I/F, Digimatic Output, RS-232C I/F, External SW I/F
Data storage: Memory card (option **12AAA841**)
Dimensions (W x D x H)
Control unit: 10.8x4.29x7.8" (275 x 109 x 198mm)
Drive unit: 6.85x2.59x2"(115 x 23 x 26mm)

Mass
Display unit: Approx. 3.7lb(1.7kg)
Drive unit: .4lb(0.2kg)

Evaluation Capability: SJ-310

Applicable standards:
JIS'82, JIS'94, JIS'01, ISO'97, ANSI, VDA
Assessed profiles:
P (primary profile), R (roughness profile), DIN4776, roughness motif, waviness motif
Evaluation parameters:
Ra, Ry, Rz, Rt, Rp, Rq, Rv, Rsk, Rku, Rc, RSm, S, RPc, R3z, Rmr (c), Rpk, Rvk, Rδc,, Rk, Mr1, Mr2, Lo, Rppi, R, AR, Rx, A1, A2, Vo, HSC, Rmr, SK, Ku, RΔa, RΔq, Rlr, λa, λq, Rpm, RzJIS (JIS'01), tp (ANSI), Htp (ANSI), Wte, Wx, W, AW, Rz1max (ISO), Rmax (VDA, ANSI, JIS'82), Possible Customize
Analysis graphs:
Bearing Area Curve (BAC), Amplitude Distribution Curve (ADC)
Digital filter: 2CR, PC75, Gaussian
Cutoff length: λc: .003, .01, .03, .1, .3" (0.08, 0.25, 0.8, 2.5, 8mm) λs: .1", .3"(2.5, 8mm)
Sampling length: .003, .01, .03, .1, .3" (0.08, 0.25, 0.8, 2.5, 8mm)
Number of sampling lengths (x n):
x1, x2, x3, x4, x5, x6, x7, x8, x9, x10 arbitrary length (0.3 to16.0mm: 0.01mm interval)
x1, x2, x3, x4, x5, x6, x7, x8, x9, x10 arbitrary length (0.3 to 5.6mm: 0.01mm interval)*
* Only for Transverse tracing drive unit type
Printer: Thermal type
Printing width: 48mm (paper width: 58mm)
Recording magnification
Vertical magnification: 10X to 100,000X, Auto
Horizontal magnification: 1X to 1,000X, Auto

Function: SJ-310

Customization: Desired parameters can be selected for calculation and display.
Statistical processing: Maximum value, minimum value, mean value, standard deviation, pass rate, histogram of each parameter
GO/NG judgment: maximum value rule, 16% rule, average value rule, standard deviation (1σ, 2σ, 3σ)
Storage: Internal memory: Measurement condition (10 sets)
Memory card (Option): 500 measurement conditions, 10000 measured profiles, 500 display images, Text file (Measurement conditions / Measured profile / Assessed profile / Bearing area curve / Amplitude distribution curve), 500 statistical data, etc.
Calibration: Auto-calibration with the entry of numerical value /Average calibration with multiple measurement (Max.12 times) is available.
Power saving function: Auto-sleep-function, Auto light-off of Backlight by ECO mode.

Surftest SJ-310
SERIES 178 — Portable Surface Roughness Tester

Surftest SJ-310

- Complies with the following standards: JIS (JIS-B0601-2001, JIS-B0601-1994, JIS B0601-1982), VDA, ISO- 1997, and ANSI.
- The Measure-Start and other frequently used buttons are strengthened to resist wear and the detrimental effects of workshop contaminants.
- Equipped with a large-capacity battery allowing approximately 1500 measurements when fully charged.
- Includes convenient carrying case for protection in the field.
- A high-speed printer is built into the main unit. Either landscape or portfolio mode can be selected according to the application. Paper saving mode is supported.
- The display interface supports 16 languages, which can be freely switched.
- 10 sets of measurement conditions can be saved in the measurement unit–an optional memory card can save measurement conditions and the measured profile.
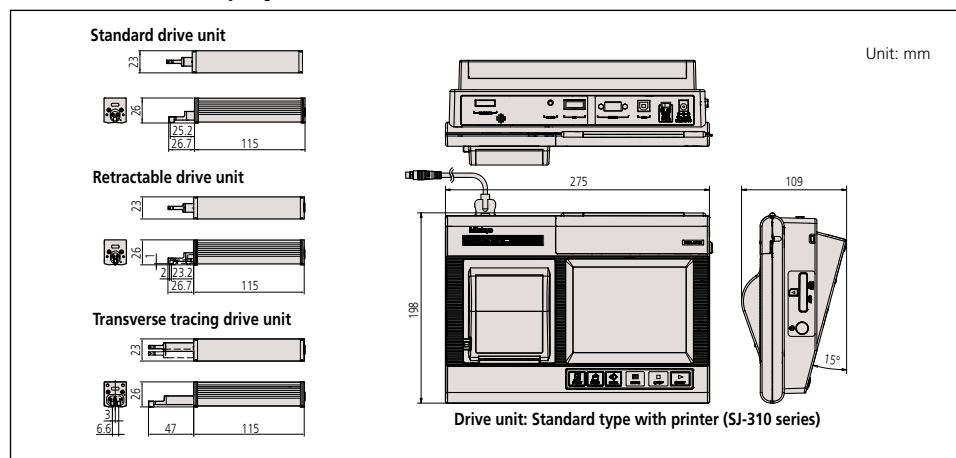
FEATURES

- The data processing unit offers large 5.7-inch color graphic LCD touch-panel for superior readability and operability.
  The LCD also includes a backlight for improved visibility in dark environments.
- The excellent user interface provides intuitive and easy-to-understand operability.

SPECIFICATIONS/CONFIGURATION

Model No.	SJ-310					
Order No. (inch/mm)	178-571-01A	178-571-02A	178-573-01A	178-573-02A	178-575-01A	178-575-02A
Drive unit	Standard type (**178-230-2**)		Retractable type (**178-235**)		Transverse tracing type (**178-233-2**)	
Detector	0.75mN type (**178-296**)	4mN type (**178-390**)	0.75mN type (**178-296**)	4mN type (**178-390**)	0.75mN type (**178-387**)	4mN type (**178-386**)
Display unit	Standard type with printer					
Detector: Tip angle	60°	90°	60°	90°	60°	90°
Stylus tip radius	2µm	5µm	2µm	5µm	2µm	5µm
Detector measuring force	0.75mN	4mN	0.75mN	4mN	0.75mN	4mN
Standard accessories	**12AAM475** Connecting cable **12AAA217** Nosepiece for plane surface **12AAA218** Nosepiece for cylinder **12AAA216** Supporting leg **12BAK700** Calibration stage **12BAG834** Stylus pen **12BAL402** Protection sheet **270732** Printer paper (5 pieces) **12BAL400** Carrying case Roughness reference specimen (Ra 3µm), AC adapter, Philips screwdriver, Strap for stylus pen, Operation manual, Quick reference manual, Warranty				**12AAM475** Connecting cable **12AAE643** Point-contact adapter **12AAE644** V-type adapter **12BAK700** Calibration stage **12BAG834** Stylus pen **12BAL402** Protection sheet **270732** Printer paper (5 pieces) **12BAL400** Carrying case Roughness reference specimen (Ra1µm), AC adapter, Philips screwdriver, Strap for stylus pen, Operation manual, Quick reference manual, Warranty	

DIMENSIONS   Display unit, Drive unit

Unit: mm

**Standard drive unit**
23
26
25.2
26.7
115

Retractable drive unit
23
26
2 23.2
26.7
115

Transverse tracing drive unit
23
26
3
6.6
47
115

275
109
198
15°

Drive unit: Standard type with printer (SJ-310 series)

Mitutoyo

Surftest SJ-210 / SJ-310

SERIES 178 — Optional Accessories

Detectors

Unit: mm

Standard detectors

Order No.	Measuring force	Stylus profiles*	Remarks column
178-296	0.75mN	2µmR/60°	Dedicated to the standard/ retractable drive unit
178-390	4 mN	5µmR/90°	
178-387	0.75mN	2µmR/60°	Dedicated to the transverse tracing drive unit
178-386	4 mN	5µmR/90°	
178-395	0.75mN	2µmR/90°	Dedicated to the standard/ retractable drive unit
178-391	4 mN	10µmR/90°	

* Tip radius / Tip angles
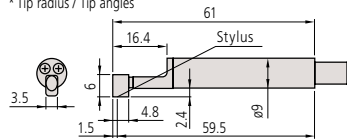
Small hole detectors

Order No.	Measuring force	Stylus profiles*	Remarks column
178-383	0.75mN	2µmR/60°	Minimum measurable hole diameter: ø4.5mm
178-392	4 mN	5µmR/90°	

* Tip radius / Tip angles
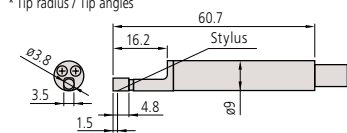
Extra small hole detectors

Order No.	Measuring force	Stylus profiles*	Remarks column
178-384	0.75mN	2µmR/60°	Minimum measurable hole diameter: ø2.8mm
178-393	4 mN	5µmR/90°	
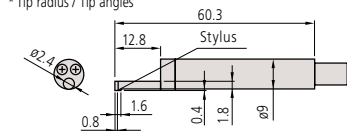
* Tip radius / Tip angles

Gear-tooth surface detectors

Order No.	Measuring force	Stylus profiles*
178-388	0.75mN	2µmR/60°
178-398	4 mN	5µmR/60°

* Tip radius / Tip angles
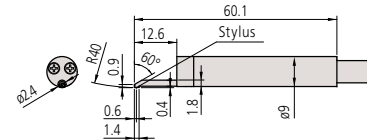
Deep groove detectors

Order No.	Measuring force	Stylus profiles*	Remarks column
178-385	0.75mN	2µmR/60°	Not available for the transverse tracing drive unit
178-394	4 mN	5µmR/90°	

* Tip radius / Tip angles
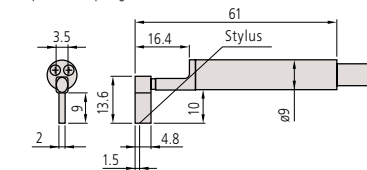
SJ-Printer for SJ-210

Assessed profiles and calculation results and curves can be printed out by connecting the SJ-210-dedicated printer, which is palm sized (W x D x H: 93x125x70mm) and can run on an internal battery.
• Power supply can be selected. (AC adapter or battery pack)
• Printable items: Measurement conditions, calculation results, assessed profile, bearing area curve (BAC), amplitude distribution curve (ADC), and environment settings.

178-421A

*Not compatible with older **SJ-201** models.

Example of the connection with **SJ-210**
Durable Printer paper (25m, 5 rolls/set): **12AAA876**

Printer paper (5 packs): **270732**
RS-232C cable: **12AAL067**

DP-1VR

It is possible to process Digimatic data output from the Surftest SJ series with the DP-1VR. This compact, hand-held device can provide printouts of measurement data and various statistical analyses results such as histograms, D-charts, and X bar R control charts. With optional output cables, DP-1VR is also capable of RS-232C output of measurement data to a PC (cable **09EAA084**) and GO/NG condition output (cable **965516**).

264-504-5A

Connecting cable: **936937** 40″(1m)
Connecting cable: **965014** 80″ (2m)
AC adapter: **09EAA088**
Printer paper: **09EAA082**

MiCAT
Mitutoyo Intelligent Computer Aided Technology

the standard in world
metrology software

FORM

Free Communication Software
SJ-Tools

This program can be downloaded for FREE from the Mitutoyo website. http:www.mitutoyo.com

Output software based on Microsoft-Excel* for controlling the devices and reproducing and storing the measurement data.

 * Microsoft-Excel is not included in the scope of supply.

Complete with exclusive accessories.
• Measurement device control
• Definition of measurement variables
• Graphic representation of the profile
• Storage of measurement records
• Documentation of measurement results
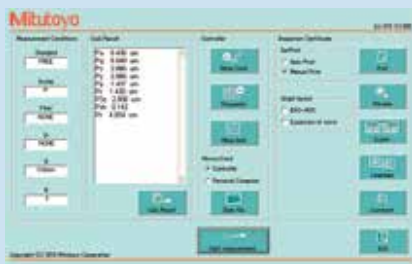• Connecting cable

Optional cables are required.
12AAL068: USB PC connecting cable (USB cable) for SJ-210
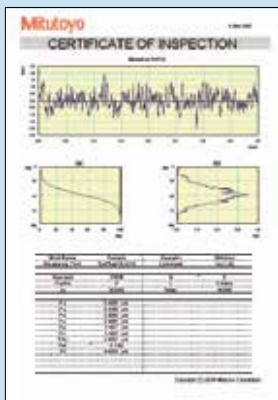**12AAD510:** USB PC connecting cable (USB cable) for SJ-310/410
12AAL067: RS-232C cable for SJ-210
12AAA882: RS-232C cable for SJ-310/410
12AAH490: USB PC connecting cable for SJ-500/SV-2100

SJ-Tools input mask for Surftest SJ series

SJ-Tools output record from MS-Excel

Optional Accessories
12AAL272: SJ-210 Replacement Battery Pack
12AAN046: SJ-310 Replacement Battery Pack
12BAK820: SJ-210 Display Protection Sheet (1pc.)
12AAL066: SJ-210 Display Protection Sheet (5pcs.)
12BAL402: SJ-310 Display Protection Sheet (1pc.)
12AAN040: SJ-310 Display Protection Sheet (10pcs.)
178-601: Precision Reference Specimen (Ra 3.00 μm)
178-602: Precision Reference Specimen (Ra 119 μin / 3.00 μm)
178-603: Precision Reference Specimen – 2 values (GAR)
178-604: Precision Reference Specimen – 2 Values (MIT)
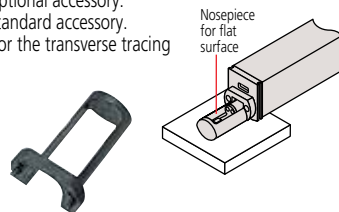**178-606:** Precision Reference Specimen for Transverse Drive (Ra 0.039 μin /1.0 μm)
178-029: Manual Column Stand
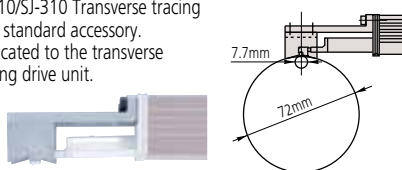
Nosepiece, Adapter
Nosepiece for flat surfaces
12AAA217
• SJ-210/210R optional accessory.
• SJ-310/310R standard accessory.
• Not available for the transverse tracing drive unit.

Nosepiece for flat surface

V-type adapter
12AAE644
• SJ-210/SJ-310 Transverse tracing type standard accessory.
• Dedicated to the transverse tracing drive unit.

7.7mm
72mm

Extension rod (50mm)
12AAA210
• Not available for the transverse tracing drive unit.
(Note: Only one rod can be used.)

Extension rod 50 mm

Magnetic stand adapter
12AAA221 (ø8mm)
12AAA220 (ø9.5mm)

Magnetic stand adapter

Extension cable (1m)
12BAA303
• Only one cable can be used.

Nosepiece for cylindrical surfaces
12AAA218
• SJ-210/210R optional accessory.
• SJ-310/310R standard accessory.
• Not available for the transverse tracing drive unit.
• ø30mm or smaller workpiece

Nosepiece for cylindrical surface
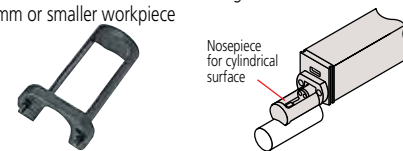
Point-contact adapter
12AAE643
• SJ-210/SJ-310 Transverse tracing type standard accessory.
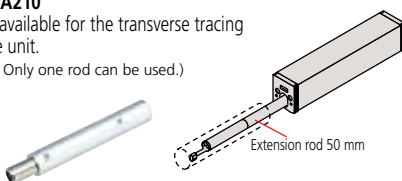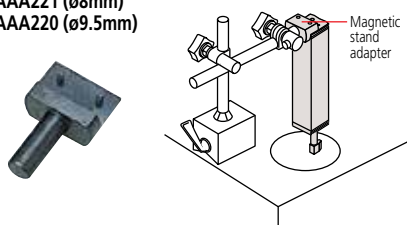• Dedicated to the transverse tracing drive unit.

Support feet set
12AAA216
• SJ-210/210R optional accessory.
• SJ-310/310R standard accessory.
• Not available for the detector side of the transverse tracing drive unit.

Support feet set
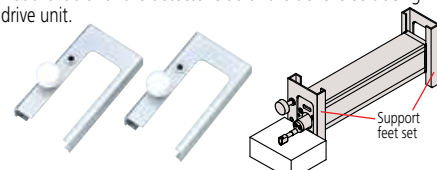
Vertical positioning adapter
12AAA219
• Not available for the transverse tracing drive unit.

Vertical positioning adapter
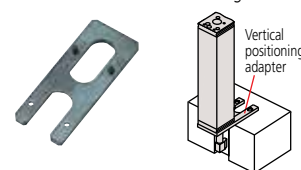
Height gage adapter
12AAA222 (9mm x 9mm)
12AAA233 (1/4" x 1/2")

Height gage adapter

Setting attachments
* Not available for the transverse tracing drive unit

Improves measurement efficiency by allowing the setup of multiple workpieces of the same type and the positioning of hard-to-access features of a workpiece.

No. 178-033
V-type for measuring in the cylinder axis direction

The V-width is adjustable to the cylinder diameter facilitating axial measurement of a wide range of cylinder diameters.
• Adjustable range: ø 5 - 150mm

No. 178-034
Setting attachment: Magnetic slider type

The magnet attached to the bottom surface of the frame allows hands-free measurements to be made.

No. 178-035
Setting attachment: Inside diameter type

Greatly facilitates measurement of internal wall surfaces of, for example, cylinder-block bores.
• Applicable diameter: ø75 - ø95mm
• Accessible depth: 30 - 135mm

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Surftest SJ-410

SERIES 178 — Portable Surface Roughness Tester

FEATURES

- Both skidded and skidless measurement are possible with this series. Equipped with 46 roughness parameters that conform to the latest ISO, DIN, ANSI, and JIS standards.
- A wide-range, high-resolution detector and a drive unit provide superior high-accuracy measurement in its class.

Detector
  Measuring range: 800µm
  Resolution: 0.000125µm (at 8µm range)

Drive unit
  Straightness/traverse length
  SJ-411: 0.3µm/25mm
  SJ-412: 0.5µm/50mm

SJ-412 drive unit

SJ-411 drive unit

- A skidless detector and a curved surface compensation function provide efficient evaluation of cylinder surface roughness.

- Ultra-fine steps, straightness and waviness can be measured by using the skidless measurement function.
- The handheld data processing unit and the 5.7-inch color graphic LCD touch-panel provides superior readability and operability. The LCD also includes a backlight for improved visibility in dark environments.
- The excellent user interface provides intuitive and easy-to-understand operability.
- Measured data can be output to a PC with optional RS-232C or USB cable.
- Digital filter function for non-distorted roughness profiles.
- GO/NG judgment function.
- Auto-calibration function.
- The display interface supports 16 languages, which can be freely switched.
- Simplified contour analysis function supports the four types of measurement: step, level change, area and coordinate difference.
- Access to each feature can be password-protected, which prevents unintended operations and allows you to protect your settings.
- The optional attachments for mounting on a column stand significantly increase the operability.

Skidless measurement

Surftest SJ-411

SPECIFICATIONS

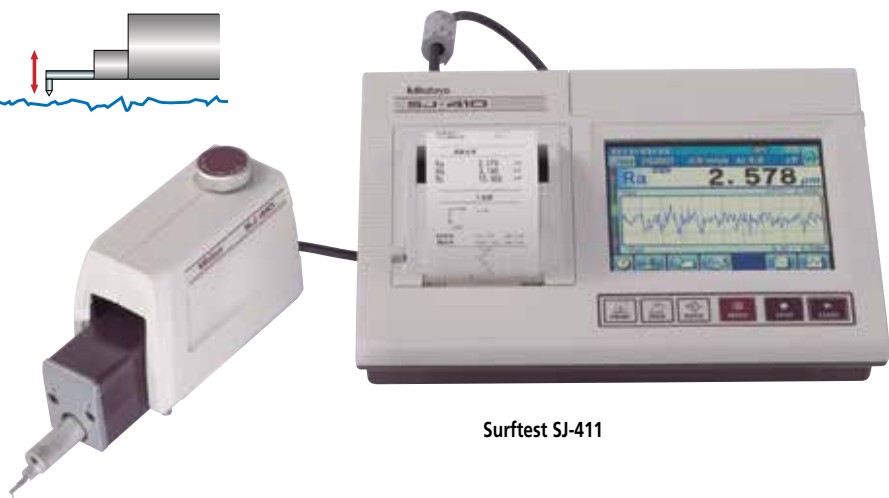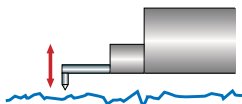| Model No.		SJ-411	SJ-411	SJ-412	SJ-412
Order No. (inch/mm)		**178-581-01A**	**178-581-02A**	**178-583-01A**	**178-583-02A**
Detector measuring force		0.75mN	4mN	0.75mN	4mN
Evaluation range		25mm	25mm	50mm	50mm
Stylus tip	Tip angle	60°	90°	60°	90°
	Tip radius	2µm	5µm	2µm	5µm

Technical Data: X axis (drive unit)

  Measuring range: 1"(25mm)(SJ-411), 2"(50mm) (SJ-412)
  Measuring speed: .002, .004, .008, .02, .04"/s
                       (0.05, 0.1, 0.5, 1.0mm/s)
  Return speed: .02, .04, .08"/s (0.5, 1.0, 2.0mm/s)
  Traversing direction: Pulling
  Traverse linearity: 12 µin / 1"(0.3µm/25mm) (SJ-411),
                       20 µin / 2"(0.5µm/50mm) (SJ-412)
  Positioning: ±1.5° (tilting), 10mm (up/down)
Detector
  Range / resolution: 800µm / 0.0125µm, 80µm / 0.00125µm,
                       8µm / 0.000125µm (up to 2400µm with
                       an optional stylus)
  Measurement method: Skidless / skidded
  Measuring force: 0.75mN or 4mN
  Stylus tip: Diamond, 60° / 2µmR
                       (90° / 5µmR)
  Skid radius of curvature: 40mm
  Type: Differential inductance
  Power supply: Via AC adapter / rechargeable battery
  Battery life: Max. app. 1000 measurements (w/o printing)
  Recharge time: 4 hours Data output Via USB interface /
                       RS-232C interface / SPC output
Storage:Internal memory: Measurement condition (10 sets)
Memory card (Option): 500 measurement conditions,
  10000 measured profiles, 500 display images, Text file
  (Measurement conditions / Measured profile / Assessed
  profile / Bearing area curve / Amplitude distribution curve),
  500 statistical data, etc.
Dimensions (W x D x H)
  Display unit: 10.8x4.3x7.8"(275x109 x198mm)
  Height-tilt adjustment unit: 5.16x2.48x3.9"(131x63x99mm)
  Drive unit: 5.04x1.41x1.83"(128x36x47mm)(SJ-411),
                       6.1x1.41x1.83"(155x36x47mm) (SJ-412)
  Mass Control unit: Approx. 3.75lb(1.7kg)
  Height-tilt adjustment unit: Approx. .9lb(0.4kg)
  Drive unit: 1.3lb(0.6kg) (SJ-411), 1.5lb(0.7kg)(SJ-412)

Evaluation Capability

Applicable standards: JIS'82, JIS'94, JIS'01, ISO'97, ANSI, VDA, Free
Assessed profiles: P (primary profile), R (roughness profile),
                       DF (DF profile), W (filtered waviness profile),
                       roughness motif, waviness motif
Evaluation parameters: Ra, Rq, Rz, Ry, Rp, Rv, Rt, R3z, Rsk, Rku,
  Rc, RPc, RSm, Rmax(VDA, ANSI), Rz1max(ISO'97), S, HSC,
  RzJIS(JIS'01), Rppi, RΔa, RΔq, Rlr, Rmr, Rmr(c), Rδc, Rk, Rpk, Rvk,
  Mr1, Mr2, A1, A2, Vo, λq, Lo, Rpm, tp(ANSI), Htp(ANSI), R, Rx,
  AR, W, AW, Wx, Wte
Analysis graphs: Bearing Area Curve (BAC),
                       Amplitude Distribution Curve (ADC)
Digital filter   2CR, PC75, Gaussian
Cutoff length   λc: .003, .01, .03, .1, .3"
                       (0.08, 0.25, 0.8, 2.5, 8mm)
                       λs: 100, 320, 1000µin
                       (2.5, 8, 25µm)(Availability of switching
                             depends of the selected standard.)
Sampling length: 0.08, 0.25, 0.8, 2.5, 8, 25*mm; or
                       arbitrary length in range 0.1 to 25mm
                       (0.1 to 50mm: SJ-412) in 0.01mm
                       increments
Number of sampling lengths: 1, 2, 3, ~20 (limited by traverse range)
Printer: Thermal type
Printing width: 48mm (paper width: 58mm)
Recording magnification
  Vertical magnification: 10X to 100,000X, Auto
  Horizontal magnification: 1X to 1,000X, Auto
Function
  Customize: Selection of display/evaluation parameter
  Data compensation: R-surface, Tilt compensation
  Ruler function: Step, level change, area and coordinate
                       difference
  D.A.T. function: Helps to level workpiece prior to skidless
                       measurement Displacement detection mode
                       enables the stylus displacement to be
                       input while the drive unit is stopped.
  Statistical processing: Max. value, Min. value, Mean value,
                       Standard deviation (s), Pass ratio, Histogram
  GO/NG judgement: Maximum value rule, 16% rule, average
                       value rule, standard deviation (1σ, 2σ, 3σ)
  Calibration: Auto-calibration with the entry of numerical
                       value /Average calibration with multiple
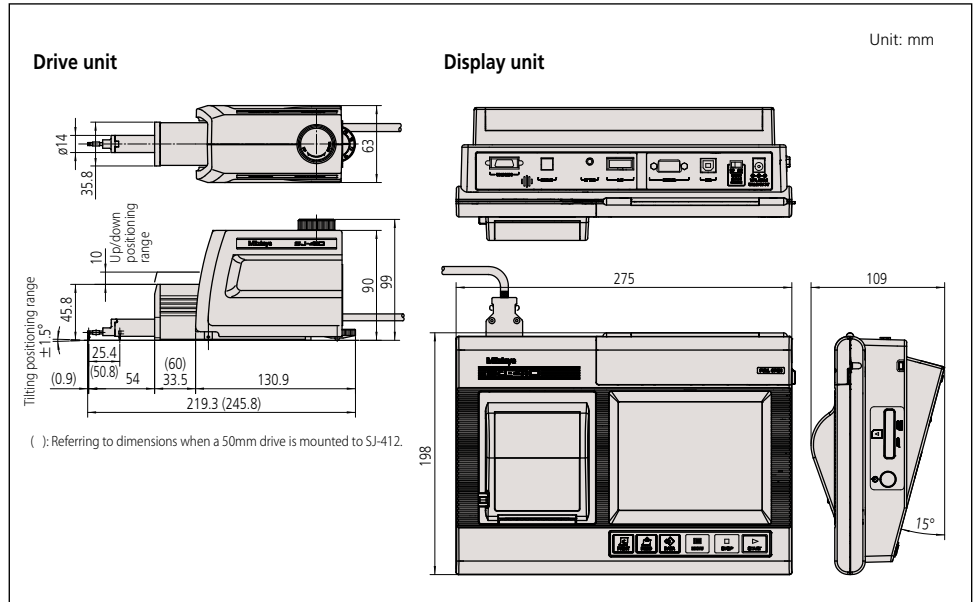   measurement (Max.12 times) is available.
  Power saving function: Auto-sleep-function, Auto light-off of
                       Backlight by ECO mode.

* Only for SJ-412

Surftest SJ-410

SERIES 178 — Portable Surface Roughness Tester

MiCAT
Mitutoyo Intelligent Computer Aided Technology

the standard in world
metrology software

FORM

Free Communication Software
SJ-Tools

This program can be downloaded for FREE from the Mitutoyo website. http:www.mitutoyo.com

Output software based on Microsoft-Excel* for controlling the devices and reproducing and storing the measurement data.
*Microsoft-Excel is not included in the scope of supply.

Complete with exclusive accessories.
- Measurement device control
- Definition of measurement variables
- Graphic representation of the profile
- Storage of measurement results
- Documentation of measurement results

Optional cables are required.
12AAD510: USB PC connecting cable (USB cable)
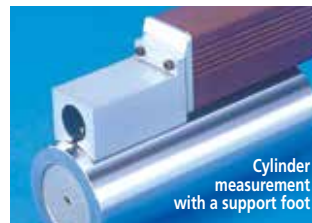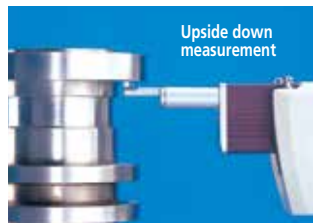**12AAA882**: RS-232C connecting cable

Optional Accessories
178-611: Step gage (2µm, 10µm)
178-612: Step gage (2µm, 10µm, 79µin, 394µin)
178-610: Step gage (step: 1µm, 2µm, 5µm, 10µm)
12AAM556: Height/tilt adjustment unit for SJ-410
178-039: Manual column stand (granite base) (vertical travel: 250mm)
178-010: Auto-set unit for **178-039**
178-020: X axis adjustment unit for **178-039**
178-030: Tilting adjustment unit (Inclination adjustment unit) for **178-039**
12AAB358: Cylindrical surface adapter (workpiece dia.: 15 - 60mm)
178-016: Leveling table (tilting: ±1.5°, max. loading: 15kg)
178-048: Leveling table with D.A.T function (mm) (tilting: ±1.5°, max. loading: 15kg)
178-058: Leveling table with D.A.T function (inch) (tilting: ±1.5°, max. loading: 15kg)
178-043-1: XY leveling table (25 x 25mm) (tilting: ±1.5°, max. loading: 15kg, swiveling: ±3°)
178-053-1: XY leveling table (1" x 1") (tilting: ±1.5°, max. loading: 15kg, swiveling: ±3°)
178-042-1: Digital XY leveling table (25 x 25mm) (tilting: ±1.5°, max. loading: 15kg, swiveling: ±3°)
178-052-1: Digital XY leveling table (1" x 1") (tilting: ±1.5°, max. loading: 15kg, swiveling: ±3°)
178-049: Digital XY leveling table (25 x 25mm) (max. loading: 15kg)
178-059: Digimatic XY leveling table (1" x 1") (max. loading: 15kg)
178-019: Precision vise for XY leveling table (jaw opening: 36mm)
998291: Precision V-block for XY leveling table (workpiece dia.: 1 - 160mm)
12AAA841: Memory card
965014: SPC cable (2m)
264-012-10: Input tool (USB type)
264-504-5A: DP-1VR
———: Detectors, Styli, and nosepieces

Consumables
12AAN040: LCD protective sheet (10 sheets/set)
12AAA876: Durable printer paper (25m, 5 rolls/set)
270732: Printer paper (5 pack)
12AAN046: Replacement battery
12AAJ088: Footswitch

DIMENSIONS

Unit: mm

Drive unit

Display unit

ø14 · 35.8 · 63 · 10 · Up/down positioning range · 45.8 · Tilting positioning range · ±1.5° · 25.4 (50.8) · (0.9) · 54 · (60) 33.5 · 130.9 · 219.3 (245.8) · 90 · 99 · 275 · 109 · 198 · 15°

( ): Referring to dimensions when a 50mm drive is mounted to SJ-412.

MEASUREMENT APPLICATIONS

R-surface measurement

Fine contour measurement with an auto leveling table

Deep groove measurement

Upside down measurement

Cylinder measurement with a support foot

Carrying case is a standard accessory.

Manual column stand **178-039**

With optional accessories.
178-010: Auto-set unit
178-020: X-axis adjustment unit
178-030: Tilting adjustment unit

Mitutoyo

Surftest SJ-500/P, SV-2100

SERIES 178 — with Dedicated Control / PC System / Display Unit

High precision and high performance type surface roughness tester with a dedicated control unit, achieving user-friendly display and simple operation

FEATURES

- User-friendly display and simple operation equipped with a highly visible color 7.5-inch TFT LCD.
- Easy positioning
  A joy stick built in the dedicated control unit allows easy and quick positioning. Fine positioning of a small stylus, required for measuring the inner side of a small hole, can be easily made using the manual knob.

- Easy setting of measuring conditions for surface roughness.
  Equipped with simple input function allows inputs according to drawing instruction symbols of ISO/JIS roughness standards. Troublesome measuring condition settings can be easily input by directly selecting a drawing instruction symbol for surface roughness from the menu.
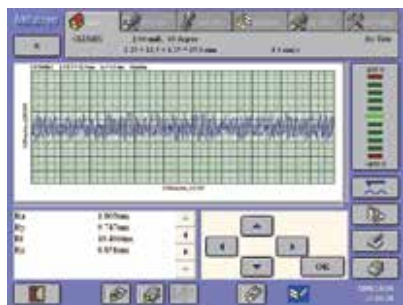
SJ-500
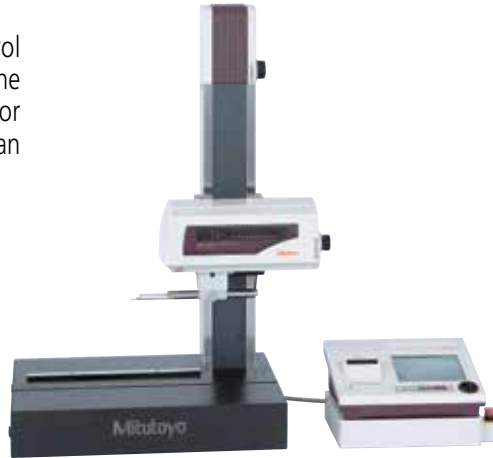
SV-2100S4

SJ-500P

SURFPAK-EZ: Easy-to-use task-focused software

Measurement and results display screen

User-friendly graphical display and button layout allows intuitive operation. Simplified fine-contour analysis provided as standard, including step, area, angle, and circle calculation.

Technical Data: SJ-500

X-axis (drive unit)
Measuring range:	1.97" (50mm)
Resolution:	1.97µin (0.05µm)
Measurement method:	Linear encoder
Drive speed:	0 - 0.78"/s (0 - 20mm/s)
Measuring speed:	0.00078 - 0.2"/s (0.02 - 5mm/s)
Traversing direction:	Pull
Traverse linearity:	0.0078µin/1.97" (0.2µm / 50mm)
Positioning:	±1.5° (tilting, with DAT function)
	1.18" (30mm) (up/down)

Detector
resolution / Range:	0.4µin/32000µin, 0.04µin/3200µin, 0.004µin/320µin
	0.01µm (800µm), 0.001µm (80µm), 0.0001µm (8µm)
Detecting method:	Skidless / skid measurement
Measuring force:	4mN or 0.75mN (low force type)
Stylus tip:	Diamond, 90° / 5µmR
	(60° / 2µmR: low force type)
Skid radius of curvature:	1.57" (40mm)
Detecting method:	Differential inductance

Control unit
Display:	7.5" color TFT with backlight
Printer:	Built-in thermal printer
Magnification:	Horizontal: X10 to X500,000, Auto
	Vertical: X0.5 to X10,000, Auto
Drive unit control:	Joystick operation with manual knob

Technical Data: SV-2100

X-axis (drive unit)
Measuring range:	3.94" (100mm)
Resolution:	1.97µin (0.05µm)
Measurement method:	Linear encoder
Drive speed:	0 - 1.57"/s (0 - 40mm/s)
Measuring speed:	0.00078 - 0.197"/s (0.02 - 5mm/s)
Traversing direction:	Pull
Traverse linearity:	6µin/4" (0.15µm / 100mm)

Z2-axis (column)
Type:	Manual operation or power drive
Vertical travel:	13.8" or 21.6" (350mm or 550mm*)
Resolution*:	1µm
Measurement method*:	Rotary encoder
Drive speed*:	0 - 0.78"/s (0 - 20mm/s)
*Only for power drive type	

Detector
resolution / Range :	0.4µin/32000µin, 0.04µin/3200µin, 0.004µin/320µin
	0.01µm / 800µm , 0.001µm / 80µm, 0.0001µm / 8µm
Detecting method:	Skidless / skid measurement
Measuring force:	4mN or 0.75mN (low force type)
Stylus tip:	Diamond, 90° / 5µmR
	(60° / 2µmR: low force type)
Skid radius of curvature:	1.57" (40mm)
Detecting method:	Differential inductance

Control unit
Display:	7.5" color TFT with backlight
Printer:	Built-in thermal printer
Magnification:	Horizontal: X10 to X500,000, Auto
	Vertical: X0.5 to X10,000, Auto
Drive unit control:	Joystick operation with manual knob

Evaluation Capability

Cutoff length
  ls: 0.25µm, 0.8µm, 2.5µm, 8µm, 25µm, 250µm, no filter
  lc*: 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm
  lf: 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm, no filter
Sampling length (L)*
  0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm, 80mm (SV-2100 only)
Data compensation functions
  Parabola compensation, hyperbola compensation, ellipse compensation, R-plane (curved surface) compensation, conic compensation, tilt compensation
*Arbitrary length can be specified in the range from 0.02mm to 50mm.

12AAA876: High durable Printer Paper (5 Rolls/set)

270732: Standard type printer paper (5pcs.)

Surftest SJ-500/P, SV-2100

SERIES 178 — with Dedicated Control / PC System / Display Unit

SPECIFICATIONS

Model no.	SJ-500P	SJ-500	SV-2100M4	SV-2100S4	SV-2100H4	SV-2100W4
Type of Data processing	PC System	Dedicated Data Processor	Dedicated Data Processor			
Order No. (inch)	**178-531-02A**	**178-533-02A**	**178-637-01A**	**178-681-01A**	**178-683-01A**	**178-685-01A**
Measuring force of detector	4mN	4mN	0.75mN			
X-axis measuring range	2" (50mm)		4" (100mm)			
Vertical travel	Optional stand		13.8" (350mm) manual column	13.8" (350mm) power column	21.6" (550mm) power column	
Granite base size (WxD)	Optional stand		23.6" x 17.7" (600 x 450mm)			39.4" x 17.7" (1000 x 450mm)
PC I/F Unit	13.7" x 10.4" x 3.4" (350 x 263 x 86mm)	NA	NA	NA	NA	NA
Dimensions (main unit, WxDxH)	16.7" x 3.7" x 6.3" (425 x 94 x 160mm)		28.2" x 17.7" x 34" (716 x 450 x 863mm)	28.2" x 17.7" x 38" (716 x 450 x 966mm)	28.2" x 17.7" x 46" (716 x 450 x 1166mm)	44" x 17.7" x 46.3" (1116 x 450 x 1176mm)
Main unit Mass	5.9 lbs. (2.7 kg)		308.6 lbs. (140 kg)	308.6 lbs. (140 kg)	330 lbs. (150 kg)	485 lbs (220 kg)
Assessed profiles	Dedicated data processor type: P (primary profile), R (roughness profile), WC, envelope residual profile, roughness motif, waviness motif PC system type: P (primary profile), R (roughness profile), WC, WCA, WE, WEA, DIN4776 profile, E (envelope residual profile), roughness motif, waviness motif					
Evaluation parameters	Dedicated data processor type: Ra, Rc, Ry, Rz, Rq, Rt, Rmax, Rp, Rv, R3z, Sm, S, Pc, mr (c), δc, mr, tp, Htp, Lo, lr, Ppi, HSC, $\triangle$a, $\triangle$q, Ku, Sk, Rpk, Rvk, Rk, Mr1, Mr2, A1, A2, Vo, λa, λq, R, AR, Rx, W, AW, Wx, Wte, (43 parameters), Customization PC system type: Pa, Pq, Psk, Pku, Pp, Pv, Pz, Pt, Pc, PSm, P$\triangle$q, Pmr (c), Pmr, Pδc, Ra, Rq, Rsk, Rku, Rp, Rv, Rz, Rt, Rc, RSm, R$\triangle$q, Rmr (c), Rmr, Rδc, Wa, Wq, Wsk, Wku, Wp, Wv, Wz, Wt, Wc, WSm, W$\triangle$q, Wmr (c), Wmr, Wδc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Rx, AR, R, Wx, AW, W, Wte, Ry, RyDIN, RzDIN, R3y, R3z, S, HSC, Lo, lr, $\triangle$a, λa, λq, Vo, Htp, NR, NCRX, CPM, SR, SAR, NW, SW, SAW					
Analysis graphs	Dedicated data processor type: ADC, BAC, power spectrum graph PC system type: ADC, BAC Graph, power spectrum graph, auto-correlation graph, Walsh power spectrum graph, Walsh auto-correlation graph, slope distribution graph, local peak distribution graph, parameter distribution graph					
Curved surface compensation	Dedicated data processor type: Parabolic compensation, Hyperbolic compensation, Elliptical compensation, Circular compensation Conic compensation, Inclination (Entire, Arbitrary) PC system type: Parabolic compensation, Hyperbolic compensation, Elliptical compensation, Circular compensation, Conic compensation, Inclination (Entire, Arbitrary), Polynomial compensation					
Contour analysis	Dedicated data processor type: Area, Circle, Angle, Coordinate difference, Step, Inclination PC system type (SURFPAK-EZ): Area, Circle, Angle, Coordinate difference, Step, Inclination					
Filters	Dedicated data processor type: 2CR-75%, 2CRPC-75%, Gaussian, Robust-spline PC system type: 2CR-75%, 2CR-50%, 2CRPC-75%, 2CRPC-50%, Gaussian, Robust-spline					

Manual column stand options: 178-085 and 178-089 (for SJ-500)

Suitable for desktop use in inspection rooms and such.

No.178-085* Except measuring unit
Vertical adjustment range: 11.8" (300mm)
Dimension (W × D × H): 23.6" x 17.7" x 28" (600 × 450 × 710mm)
Weight: 242 lbs (110kg)
No.178-089* Except measuring unit
Vertical adjustment range: 9.8" (250mm)
Dimension (W × D × H): 15.7" x 9.8" x 2.4" (400 × 250 × 60mm)
Weight: 44 lbs (20kg)

Dimensions of SJ-500 w/ manual column stand **178-085**

Unit: mm
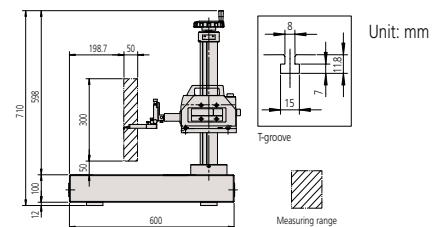
Auto-leveling table: 178-081 (for SJ-500 / SV-2100M4), 178-083 (for SV-2100S4 / H4 / W4)

This is a stage that performs fully automatic leveling as measurement starts, freeing the user from this tedious operation. Fully automatic leveling can be done quickly by anyone. In addition, the operation is easy and reliable.

Inclination adjustment angle	±2°
Maximum load	15.4 lbs (7kg)
Table dimensions	5.12" x 3.94"(130x100mm)
Mass	7.7lbs (3.5kg)

Mitutoyo

Surftest SV-3200

SERIES 178 — Surface Roughness Testers

*Shown with optional accessories.

MiCAT
Mitutoyo Intelligent Computer Aided Technology
the standard in world metrology software
FORM

SV-3200H4 with personal computer system

The Surftest SV-3200 Series provide high-accuracy, high-level analysis, and multi-functionality in measurement of surface roughness.

FEATURES

- Mitutoyo's Surftest SV-3200 Series provide high-accuracy, high-level analysis, and multi-functionality in three dimensional analysis and measurement of fine contour, as well as the conventional type surface roughness measurement.
- Peripheral devices such as the auto-leveling table are available to enhance operability and to enable automatic measurement.
- FORMTRACEPAK V5, a dedicated data-analyzing software is installed. This software allows data management in a consistent format, from the work site to the laboratory.
- Ceramic, which is known for its superb anti-abrasive property, is used as the X-axis drive unit guide. No lubrication of the guide is required.
- High-accuracy glass scales are built-in on X-axis (resolution: 1.97µin (0.05µm) and Z2-axis (column, resolution: 39.4µin (1µm) to insure high-accuracy positioning.

The SV-3200 series manifest high-reliability especially in the horizontal roughness parameters (S, Sm), that require high-accuracy of the X-axis travel.
- When equipped with high accuracy Y-axis table and 3D surface analysis software MCubeMap, this offers CNC type capabilities usually performed on Extreme series machines.
- Various optional detector holders such as Crank Rotary type and Manual Rotary type make this versatile for many different applications.
- New optional Digital Automatic Tilt (DAT) function is best suited for workpieces that are too large for leveling tables.

Technical Data

X-axis
Measuring range: 4" or 8" (100mm or 200mm)
Resolution: 1.97µin (0.05µm)
Measurement method: Linear encoder
Drive speed: 0 - 3.1"/s (0 - 80mm/s)
Measuring speed: 0.00078 - 0.2"/s (0.02 - 5mm/s)
Traversing direction: Pull
Traverse linearity: 4": (2+L)µin (0.05+0.001L)µm*
                       8": 20µin / 8"(0.5µm/200mm)

Z2-axis (column)
Vertical travel: 12"or 20"(300mm or 500mm) power drive
Resolution: 39.4µin (1µm)
Measurement method: ABSOLUTE linear encoder
Drive speed: 0 - 1.2"/s (0 - 30mm/s)

Detector
Range / resolution: 32000 µin / .4 µin, 3200µin / .04µin,
                     320 µin / .004µin
                     (up to 96000 µin with an optional stylus)
                     {(800µm / 0.01µm, 80µm / 0.001µm, 8µm
                     / 0.0001µm)
                     (up to 2400µm with an optional stylus)}
Detecting method: Skidless / skid measurement
Measuring force: 0.75mN (low force type)
Stylus tip: Diamond, 60°/2µmR (low force type)
Skid radius of curvature: 1.57" (40mm)
Detecting method: Differential inductance

Base size (W x H):   23.6 x 17.7" (600 x 450mm) or
                     39.4 x 17.7" (1000 x 450mm)
Base material: Granite
Dimension (W x D x H): 28.8 x 19.0 x 38.0"
                     (756 x 482 x 966mm) (S4-type)

                     29.8 x 19.0 x 45.9"
                     (756 x 482 x 1166mm) (H4-type)

                     45.5 x 19.0 x 46.3"
                     (1156 x 482 x 1176mm) (W4-type)

                     30.2 x 19.0 x 38.0"
                     (766 x 482 x 966mm) (S8-type)

                     30.2 x 19.0 x 45.9"
                     (766 x 482 x 1166mm) (H8-type)

                     45.9 x 19.0 x 46.3"
                     (1166 x 482 x 1176mm) (W8-type)
Mass   308 lbs (140kg) (S4-type, S8-type)
                     330 lbs (150kg) (H4-type, H8-type)
                     485 lbs (220kg) (W4-type, W8-type)
*L = Measured length inch (mm)

Evaluation Capability: FORMTRACEPAK V5

Assessed profiles
    P (primary profile), R (roughness profile), WC, WCA, WE, WEA, DIN4776 profile, envelope residual profile, roughness motif, waviness motif
Evaluation parameters
    Ra, Rq, Rz, Ry, Rz(JIS), Ry(DIN), Rc, Rp, Rpmax, Rpi, Rv, Rvmax, Rvi, Rt, Rti, R3z, R3zi, R3y, S, Pc (Ppi), Sm, HSC, mr, δc, plateau ratio, mrd, Rk, Rpk, Rvk, Mr1, Mr2, Δa, Δq, λa, λq, Sk, Ku, Lo, Lr, A1, A2
    Roughness motif parameters: Rx, R, AR, SR, SAR, NR, NCRX, CPM
    Waviness motif parameters: Wte, Wx, W, AW SW, SAW, NW
Analysis graphs
    ADC, BAC1, BAC2, power spectrum chart, auto-correlation chart, Walsh power spectrum chart, Walsh auto-correlation chart, slope distribution chart, local peak distribution chart, parameter distribution chart
Digital filter 2CR-75%, 2CR-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian-50%
Cutoff length*
    λc: .001, .003, .01, .03, .1, .3, 1"
    (0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm)
    fl: .001, .003, .01, .03, .1, .3, 1"
    (0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm)
    fh: .001, .003, .01, .03, .1, .3, 1"
    (0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm)
Sampling length (L)*.001, .003, .01, .03, .1, .3, 1"
    (0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm)
Data compensation functions
    Tilt compensation, R-plane (curved surface) compensation, ellipse compensation, parabola compensation, hyperbola compensation, quadric curve automatic compensation, polynomial compensation, polynomial automatic compensation
*Arbitrary length can be specified in the range from .001" (0.025mm) to the maximum traverse length.

Optional Accessories

178-611: Reference Step Specimen (2µm, 10µm)
178-612: Reference Step Specimen (2µm, 10µm, 79µin, 394µin)
178-610: Step gage (1µm, 2µm, 5µm, 10µm)
178-047: Three-axis adjustment table (including 998291 precision V-block.)
178-016: Leveling table
178-042-1: Digimatic XY leveling table (25 x 25mm)
178-052-1: Digimatic XY leveling table (1" x 1")
178-043-1: XY leveling table (25 x 25mm)
178-053-1: XY leveling table (1" x 1")
178-019: Precision vise*
998291: Precision V-block*
181-902-10: V-block set with clamp (Max. workpiece dia.: 25mm)
181-901-10: V-block set with clamp (Max. workpiece dia.: 1")
(See page J-22/23.) Detectors, styli, and nosepieces
*Use with an XY leveling table

Optional Accessories

A wide range of peripherals are available to support various challenging measurement needs.

Y-axis Table
178-097 for multiple workpiece measurement
178-096 for 3D measurement
*Not a measuring axis, only for positioning.

3D-Auto Leveling Table
178-077
*Used together with **178-096**

Digital Auto Tilting Unit
178-040
*Contact Sales Rep for details. Recommend to be installed in manufacturer's facility.
(See page J-25 for more accessories.)

178-071 (S-3000)
Standard Detector Holder

178-074 (S-3000C)
Crank Type Detector Holder

178-075 (S-3000CR)
Crank Rotary Type Detector Holder

178-076 (S-3000MR)
Manual Rotary Type Detector Holder

Surftest SV-3200
SERIES 178 — Surface Roughness Testers

SPECIFICATIONS

Models without X-axis inclination function

Model No.	SV-3200S4	SV-3200H4	SV-3200W4
Order No. (inch)	**178-424A-1**	**178-425A-1**	**178-426A-1**
Order No. (inch)	**178-444A-1**	**178-445A-1**	**178-446A-1**
Measuring force of detector	0.75mN	0.75mN	0.75mN
X-axis measuring range	4" (100mm)	4" (100mm)	4" (100mm)
Vertical travel	12" (300mm) power column	20" (500mm) power column	20" (500mm) power column
Granite base size (WxD)	23.6 x 17.7" (600 x 450mm)	23.6 x 17.7" (600 x 450mm)	39.4 x 17.7" (1000 x 450mm)
Dimensions (main unit, WxDxH)	29.8 x 19.0 x 38.0" (756 x 482 x 966mm)	29.8 x 19.0 x 45.9" (756 x 482 x 1166mm)	45.5 x 19.0 x 46.3" (1156 x 482 x 1176mm)
Mass (main unit)	308 lbs (140kg)	330 lbs (150kg)	485 lbs (220kg)

| Model No.	SV-3200S8	SV-3200H8	SV-3200W8
Order No. (inch)	**178-427A-1**	**178-428A-1**	**178-429A-1**
Order No. (inch)	**178-447A-1**	**178-448A-1**	**178-449A-1**
Measuring force of detector	0.75mN	0.75mN	0.75mN
X-axis measuring range	8" (200mm)	8" (200mm)	8" (200mm)
Vertical travel	12" power column	20" power column	20" power column
Granite base size (WxD)	23.6 x 17.7" (600 x 450mm)	23.6 x 17.7" (600 x 450mm)	39.4 x 17.7"(1000 x 450mm)
Dimensions (main unit, WxDxH)	30.2 x 19.0 x 38.0" (766 x 482 x 966mm)	30.2 x 19.0 x 45.9" (766 x 482 x 1166mm)	45.9 x 19.0 x 46.3" (1166 x 482 x 1176mm)
Mass (main unit)	308 lbs (140kg)	330 lbs (150kg)	485 lbs (220kg)

A variety of models available for measuring requirements

SV-3200S4
Traverse range: 4" (100mm)
Vertical travel: 12" (300mm)
Base size (W x D):
23.6" x 17.7" (600 x 450mm)
Base material: Granite
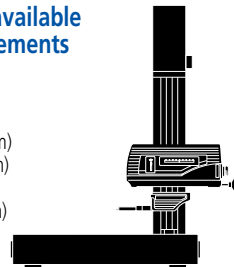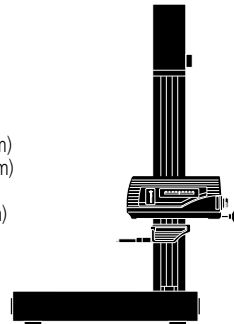
SV-3200S8
Traverse range: 8" (200mm)
Vertical travel: 12" (300mm)
Base size (W x D):
23.6" x 17.7" (600 x 450mm)
Base material: Granite
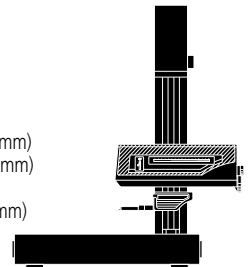
SV-3200H4
Traverse range: 4" (100mm)
Vertical travel: 20" (500mm)
Base size (W x D):
23.6" x 17.7" (600 x 450mm)
Base material: Granite

SV-3200H8
Traverse range: 8" (200mm)
Vertical travel: 20" (500mm)
Base size (W x D):
23.6" x 17.7" (600 x 450mm)
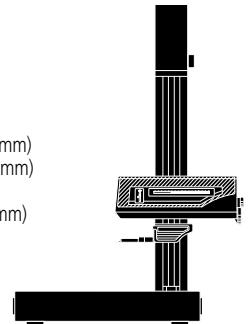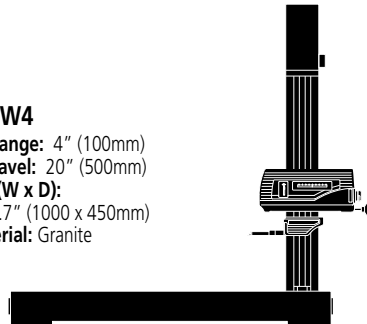**Base material:** Granite

SV-3200W4
Traverse range: 4" (100mm)
Vertical travel: 20" (500mm)
Base size (W x D):
39.4" x 17.7" (1000 x 450mm)
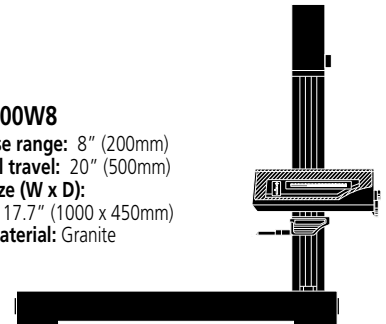**Base material:** Granite

SV-3200W8
Traverse range: 8" (200mm)
Vertical travel: 20" (500mm)
Base size (W x D):
39.4" x 17.7" (1000 x 450mm)
Base material: Granite

Mitutoyo

Surftest Extreme SV-3000CNC / SV-M3000CNC

SERIES 178 — CNC Surface Measuring Instruments

FEATURES

- High-accuracy CNC Surface Roughness Measuring Instrument that allows surface roughness measurement in both axes.
- Each axes has the maximum drive speed of 200 mm/s, which permits high-speed positioning that may result in a large increase in the throughput of multiple-profile/multiple-workpiece measurement tasks.
- For models with the α-axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the drive unit.
- For models with the Y-axis table, it is possible to expand the measuring range for multiple workpieces, etc., through positioning in the Y-axis direction.

- Using optional rotary table θ1 and θ2 designed to use with the CNC models enables it to expand the CNC measurement application range.
- Inclined plane measurements is possible through 2-axis simultaneous control in the X- and Y-axis directions.
- Since the detector unit incorporates an anti-collision safety device, the detector unit will automatically stop even if its main body collides with a workpiece or fixture.
- Supplied with an easy-to-operate Remote Box. The user can make any movement by selecting the required axis using the two joysticks. The current axis selection is easily identified by the icon on the key top.
- Communication with the Data Processing/Analysis section is via USB.

SV-3000CNC w/ PC system and software
PC stand is not included, isolation stand is optional

Technical Data: SV-3000CNC

X1-axis
- Measuring range: 8" (200mm)
- Resolution: 1.97μin (0.05μm)
- Measurement method: Reflective-type linear encoder
- Drive speed: 7.87"/s (200mm/s) (CNC, max.)
  0 - 2.4"/s (0 - 60mm/s) (joystick)
- Measuring speed: 0.00078" - 0.078"/s (0.02 - 2mm/s)
- Traversing direction: Backward
- Traverse linearity: 20 μin/8" (0.5μm/200mm)

α-axis
- Inclination angle: -45° to +10°
- Resolution: 0.000225°
- Rotating speed: 1rpm

Z2-axis (column)
- Vertical travel: 12" (300mm) 20"*(500mm)
- Resolution: 1.97μin (0.05μm)
- Measurement method: Reflective-type linear encoder
- Drive speed: 7.87"/s (200mm/s) (max., CNC)
  0 - 2.4"/s (0 - 60mm/s) (joystick)
- Base size (W x H): 29.5 x 23.6" (750 x 600mm)
- Base material: Granite

Detector
- Range / resolution: 32000 μin / .4 μin, 3200μin / .04μin, 320 μin / .004μin
  (up to 96000 μin with an optional stylus)
  {(800μm / 0.01μm, 80μm / 0.001μm, 8μm / 0.0001μm)
  (up to 2400μm with an optional stylus)}
- Measuring force: 4mN or 0.75mN (low force type)
- Stylus tip: Diamond, 90°/5μmR
  (60°/2μmR: low force type)

Dimension (W x D x H): 31.5 x 24.4 x 39.4"
  (800 x 620 x 1000mm)
  31.5 x 24.4 x 47.2"
  (800 x 620 x 1200mm)*
Mass: 529 lbs (240kg) 551lbs (250kg)*
*High column model

Optional Accessories

Vibration isolation stand
Vibration isolation mechanism: Diaphragm air spring
- Natural frequency : 2.5 - 3.5Hz
- Damping mechanism: Orifice
- Leveling mechanism: Automatic control with mechanical valves
- Air supply pressure: 0.4MPa
- Allowable loading capacity: 772 lbs (350kg)
- Dimensions (W x D x H): 39.4 x 35.2 x 28.1"
  (1000 x 895 x 715mm)
- Mass: 617 lbs (280kg)

Y-axis table unit
- Measuring range: 8" (200mm)
- Minimum reading : 1.97μin (0.05μm)
- Scale unit: Reflective-type Linear Encoder
- Drive speed: 7.87"/s (200mm/s) (max., CNC)
  0 - 2.4"/s (0 - 60mm/s) (joystick)
- Maximum loading capacity: 44 lbs (20kg)
- Traverse linearity: 20μin/8" (0.5μm/200mm)
- Linear displacement accuracy (at 20°C):
  ± (80+2L/4)μin {± (2+2L/100) μm}
  L: Dimension between two measured points (mm)
- Table size: 7.87" x 7.87" (200 x 200mm)
- Dimensions (W x D x H): 12.6 x 25.4 x 4.1"
  (320 x 646 x 105mm)
- Mass: 77 lbs (35kg)

SPECIFICATIONS

Model No.	SV-3000CNC		SV-3000CNC		SV-3000CNC		SV-3000CNC	
Order No. (100V - 120V)	**178-521-1**	**178-541-1**	**178-522-1**	**178-542-1**	**178-523-1**	**178-543-1**	**178-524-1**	**178-544-1**
X1-axis measuring range	8" (200mm)	8" (200mm)	8" (200mm)	8" (200mm)	8" (200mm)	8" (200mm)	8" (200mm)	8" (200mm)
Z2-axis vertical travel	12" (300mm)	20" (500mm)	12" (300mm)	20" (500mm)	12" (300mm)	20" (500mm)	12" (300mm)	20" (500mm)
Y-axis table unit	—	—	—	—	Installed	Installed	Installed	Installed
α-axis unit	—	—	Installed	Installed	—	—	Installed	Installed

Technical Data: SV-MC3000CNC

X1-axis
Measuring range:	8" (200mm)
Resolution:	1.97µin (0.05µm)
Measurement method:	Reflective-type linear encoder
Drive speed:	7.87"/s (200mm/s) (max., CNC)
	0 - 1.97"/s (0 - 50mm/s) (joystick)
Measuring speed:	0.00078" - 0.08"/s (0.02 - 2mm/s)
Traverse linearity:	20µin/8" (0.5µm/200mm)
	28µin/8" (0.7µm/200mm) (long-type detector)
	20µin/8" (0.5µm/200mm) (rotary-type detector, up/down direction)
	28µin/8" (0.7µm/200mm) (long-type detector, foward/backward direction)

α-axis
Inclination angle:	-45° to +10°
Resolution:	0.000225°
Rotating speed:	1rpm

Z2-axis (column)
Vertical travel:	20"(500mm)
Resolution:	1.97µin (0.05µm)
Measurement method:	Reflective-type linear encoder
Drive speed:	7.87"/s (200mm/s) (CNC, max.)
	0 - 1.97"/s (0 - 50mm/s) (joystick)

Y-axis
Measuring range:	32" (800mm)
Resolution:	1.97µin (0.05µm)
Measurement method:	Reflective-type linear encoder
Drive speed:	7.87"/s (200mm/s) (max., CNC)
	0 - 1.97"/s (0 - 50mm/s) (joystick)
Measuring speed:	0.00078" - 0.08"/s (0.02 - 2mm/s)
Traverse linearity:	20µin/2" (0.5µm/50mm), 80µin/32" (2µm/800mm) 28µin/2" (0.7µm/50mm), 120µin/32" (3µm/800mm) (long-type detector) 28µin/2" (0.7µm/50mm), 120µin/32" (3µm/800mm) (rotary-type detector, up/down direction)

Base unit
Size (W x H):	23.6 x 59.1" (600 x 1500mm)
Material:	Steel
Loading capacity:	661 lbs (300kg)

Detector
Range / resolution:	32000 µin / .4 µin, 3200µin / .04µin, 320 µin / .004µin (up to 96000 µin with an optional stylus) {800µm / 0.01µm, 80µm / 0.001µm, 8µm / 0.0001µm (up to 2400µm with an optional stylus)}
Detecting method:	Skidless / skid measurement
Measuring force:	4mN or 0.75mN (low force type)
Stylus tip:	Diamond, 90°/5µmR (60°/2µmR: low force type)
Skid radius of curvature:	1.57" (40mm)
Detecting method:	Differential inductance
Dimension (W x D x H):	42.7 x 66.7 x 75.7" (1085 x 1695 x 1922mm)
Mass	3527 lbs (1600Kg) (including vibration isolating unit)

Optional Software

FORMTRACEPAK V5

Enables control of the optional motor-driven Y-axis table and rotary table for realizing efficient measurement automation. You can also perform contour evaluation that allows free analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. In addition, analysis results can be saved in the "html","mhtml" or pdf format which allows Internet Explorer or MS-Word compatibility, allowing PC without layout editing programs to view analysis results.

Contour Measurement & Surface Roughness Measurement Screen

Report Layout Screen

Surftest Extreme SV-3000CNC / SV-M3000CNC
SERIES 178 — CNC Surface Measuring Instruments

SV-M3000CNC with personal computer system and software

* PC stand not included

FEATURES

- CNC Surface Roughness Tester that covers measurement of large/heavy workpieces such as engine blocks, crankshafts, etc.
- In combination with the surface roughness detector rotating unit, S-3000AR (optional), it can perform continuous measurement over the bottom, top and side surfaces of a workpiece.
- Compatible with the optional large table for supporting a load of 220 lbs (100 kg) or a large θ2 table. Enables continuous automatic measurement of large-size workpieces.
- Suitable for automatic surface roughness measurement on large and heavy workpieces.
- Employs the column-moving type configuration that is not restricted by workpiece size. This is advantageous for measuring heavy workpieces such as engine blocks, crankshafts, etc.
- Provides 31.5" (800mm) of Y-axis stroke. This makes it possible to measure multiple profiles on large workpieces.
- Load table has a self-contained structure to ensure that various size workpieces, jigs, auto-feed devices, etc., are easily accommodated and can be specified, if required, by special order.

SPECIFICATIONS

Model No.	SV-M3000CNC
Order No. (100V - 120V)	**178-549-1**
X1-axis measuring range	8" (200mm)
Z2-axis column travel range	20" (500mm)
Y-axis travel range	32" (800mm)
α-axis inclination angle	-45° (CCW), +10° (CW)

Mitutoyo